Project Manager's Quarterly Progress Report – 1st Quarter FY 2003
U.S. Large Hadron Collider Construction Project

1. PROJECT IDENTIFIERS

Reporting Period:	Through December 31, 2002
Program Sponsors:	DOE High Energy Physics Division/NSF Physics Division
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2. PROJECT DESCRIPTION

The Department of Energy (DOE) and the National Science Foundation (NSF) have signed agreements committing to collaboration in the construction of the Large Hadron Collider (LHC) at CERN (European Laboratory for Particle Physics) and two of its associated detectors. The U.S. fabrication effort will be carried out at, or under the supervision of, U.S. universities and national laboratories under the terms and conditions described in the International Collaboration Agreement (Agreement) and its Accelerator and Experiments Protocols. The U.S. LHC Construction Project is defined by the goods and services to be provided to CERN under the terms of the Agreement between DOE, NSF, and CERN. These goods and services include DOE contributions to the LHC accelerator, and DOE and NSF contributions to the ATLAS (A Toroidal LHC Apparatus) and CMS (Compact Muon Solenoid) experiments.

The DOE contribution to the LHC accelerator consists of items provided by DOE National Laboratories and CERN direct purchases from U.S. industrial firms. The scope of these contributions is addressed in the Accelerator Protocol and described in detail in an Implementing Arrangement between the collaborating DOE National Laboratories and CERN. The DOE and NSF contributions to the ATLAS and CMS detectors consist of items supplied by the collaborating U.S. universities and DOE National Laboratories. The scope of these contributions is addressed in the Experiments Protocol and described in detail in Memoranda of Understanding for collaboration on construction of each experiment.

The U.S. LHC Construction Project includes the U.S. ATLAS, U.S. CMS, and U.S. LHC Accelerator Construction projects. This report summarizes the overall status of the U.S. LHC Construction Project effort and includes more detailed status information on each sub-project. Additional information can be accessed at the following web sites:

U.S. LHC Project - http://www.hep.net/doe-hep/lhc.html
LHC Project - http://wwwlhc.cern.ch/ U.S. LHC Accelerator - http://www-td.fnal.gov/LHC/USLHC.html
ATLAS - http://atlasinfo.cern.ch/Atlas/Welcome.html U.S. ATLAS - http://www.usatlas.bnl.gov/
CMS - http://cmsinfo.cern.ch/Welcome.html U.S. CMS - http://uscms.fnal.gov/

3. PROJECT MANAGER'S NARRATIVE HIGHLIGHTS

The current list of DOE/NSF project reviews and status meetings is provided below:

U.S. LHC Construction Project	Event	Date
U.S. ATLAS	Quarterly Status Meeting	October 1, 2002
U.S. CMS	Quarterly Status Meeting	October 1, 2002
U.S. LHC Accelerator	Quarterly Status Meeting	October 2, 2002
U.S. CMS & ATLAS Detectors	DOE/NSF Review	December 12-13, 2002
U.S. LHC Program/Project	Joint Oversight Group Meeting	February 24, 2003
U.S. LHC Accelerator Project	DOE Review	February 25-26, 2003

The results of these activities are documented in formal reports and meeting notes. The U.S. CMS and ATLAS projects submit monthly reports and the U.S. LHC Accelerator project submits a quarterly report. Current performance data is summarized in the following tables:

Table 3.1, Schedule Performance Indices

	Planned Complete (BCWS/BAC)	Actual Complete (BCWP/BAC)	Schedule Performance (BCWP/BCWS)
U.S. ATLAS	75%	73%	97%
U.S. CMS	81%	74%	92%
U.S. LHC Accelerator	86%	82%	95%

Table 3.2, Contingency Status (in thousands of dollars)

	Total Project Cost (TPC)	Budget at Completion (BAC)	Contingency	Budgeted Cost of Work Performed (BCWP)	Remaining Work to be Performed (BAC-BCWP)	Contingency/ (BAC-BCWP)
US ATLAS	163,750	139,962	23,788	102,443	37,519	63%
US CMS	167,250	147,389	19,861	109,332	38,057	52%
US Accelerator	110,000	105,741	4,259	86,471	19,270	22%

Table 3.3, Cost & Schedule Performance (in thousands of dollars) Indices

	Cumulative Costs to Date					Costs at Completion		
	Budgeted Cost			Variance			Revised	
	Work Scheduled	Work Performed	Actual Cost	Schedule	Cost	Budgeted	Estimate	Variance
U.S. ATLAS	105,149	102,443	98,056	-2,706	4,387	163,750	163,750	0
U.S. CMS	119,498	109,332	100,295	-10,166	9,037	167,250	167,250	0
U.S. LHC Accelerator	90,701	86,471	88,572	-4,230	-2,101	110,000	110,000	0
CERN Invoices	47,214	47,214	47,214	0	0	90,000	90,000	0
U.S. LHC Total	362,562	345,460	334,137	-17,102	11,323	531,000	531,000	0

4. PROJECT MANAGER'S ASSESSMENT

The U.S. projects continue to meet their goals and are reliable and influential partners in the construction of the ATLAS and CMS detectors and the LHC machine.

Cost – Cost performance is good. The cumulative Cost Performance Index (CPI) for the total U.S. LHC Construction Project (U.S. ATLAS, U.S. CMS, and U.S. LHC Accelerator) is 1.04, which is slightly favorable. Each project maintains an adequate level of contingency. The current Estimate At Completion for the U.S. LHC Accelerator project indicates that contingency is marginal and needs to be monitored closely.

The U.S. LHC Accelerator project office continues to aggressively manage remaining contingency and work with all 3 Laboratories to identify potential risks and strategies for mitigation. Good progress has been made in finalizing the engineering specifications and bid packages for the cryogenic feedbox. The fabrication cost will be updated after placing the fabrication contract with the cryogenic system integrator, expected to occur next quarter. U.S. CMS contingency, at ~50% of remaining costs, is considered sufficient to bring the present scope in successfully. Recent contingency usage has been primarily to maintain schedule and address production costs. Future contingency use is also possible for additional electromagnetic calorimeter chip (FPPA) submissions to address design issues on this critical path item. U.S. ATLAS contingency as a fraction of costs to completion is trending upward as a result of very good recent technical progress. Usage of available contingency on items essential for a working detector, through U.S. commitments added in coordination with ATLAS, are anticipated, as is future contingency usage in the area of installation.

Schedule – Schedule performance is measured by milestone completion and by earned value. The total U.S. LHC Construction Project schedule overall is slightly behind plans with a cumulative Schedule Performance Index (SPI) of 0.95 , indicating no major slippages in schedule. The total U.S. LHC Construction Project is seventy-six percent complete based on earned value. The CERN schedule calls for first beams in April '07. A period of beam commissioning will be followed by start of the LHC Physics Program in the latter half of '07. U.S. LHC Accelerator Project milestones for deliverables have been updated based on current U.S. production schedules and the LHC installation schedule, with float between expected U.S. delivery dates and CERN installation requirements. The production schedule for the cryo-genic feedboxes is pending award of a contract, expected next quarter. A delay in the LHC machine schedule is not expected to have adverse impact on the U.S. LHC Accelerator Construction Project schedule.

Completion of a small percentage (~3%) of the U.S. ATLAS and U.S. CMS Construction Project scope or "deliverables" is now scheduled to beyond September '05 (prior Project Completion milestone). This scope is intimately tied to the CERN LHC start-up schedule, and concerns final detector installation and high technology commodity procurement items. A Baseline Change Proposal addressing this was reviewed by a DOE ESAAB equivalent this quarter and approval by the DOE Director of the Office of Science in November, '02. With the current CERN

schedule, U.S. CMS is developing plans to begin pre-commissioning its deliverables prior to the final installation phase in the underground experimental hall. The U.S. ATLAS schedule for deliverables meets current ATLAS need dates.

Technical - Good technical progress continues across the project, and we remain confident that the U.S. deliverables to CERN can be realized with the planned funding. The U.S. LHC Construction Project deliverables are accepted by CERN and approved by the DOE/NSF Joint Oversight Group. We expect to provide additional items to CERN, within the approved funding, should cost performance be favorable. Important milestones continue to be met. The first U.S. produced LHC magnet, an Interaction Region dipole produced by BNL, was shipped to CERN and arrived in January '03. U.S. ATLAS Tile Hadron Calorimeter extended barrel module construction is complete, and calorimeter pre-assembly is underway. Both U.S. CMS Hadron Calorimeter barrels are now re-assembled at CERN and fitted with optical megatiles. Additional technical Project highlights are given in the report.

ISSUES

LHC Cost & Schedule- CERN Council unanimously endorsed a new Baseline Plan for 2003-2010, revising the 1996 LHC financial framework, and confirming the target of commissioning the LHC in April 2007. LHC Project cost-to-completion (including materials, personnel and contingency) have been set, leaving very limited resources for non-LHC programs at CERN. A first CERN Annual LHC Cost and Schedule Review was conducted, charged with understanding the basis of the CERN LHC and experimental areas costs to completion, analyzing project management and cost & schedule tracking tools, and critically reviewing the schedule for completion of the LHC project. CERN Council has also nominated Robert Aymar, director of ITER, to succeed Luciano Miani as laboratory director-general, and take office in January '04 to oversee completion and start-up of the LHC project.

ATLAS and CMS Resources– The collaborations have actively searched for further savings and new collaborators to cover funding shortfalls previously identified for detector construction completion (resulting from cost overruns, improved cost estimates, exchange rate problems, earlier civil construction delays, and some funding agencies not meeting commitments). It appears that a majority of the shortfall can be covered for both detectors, including U.S. contributions within the funding cap, to achieve working, but staged, initial detectors. The U.S. position that no additional construction funds are foreseen given the funding cap established in the International Agreement, has been clearly communicated to the CERN Directorate. The collaborations continue to consider staging trigger and data acquisition components as well as a variety of system-specific items, compatible with the initial planned lower luminosity LHC machine. The validity of detector construction MoU's has been extended to December '07 (from December '05), to accommodate the current CERN LHC and detector completion schedules.

5. NARRATIVE SUMMARY

5.1 U.S. ATLAS CONSTRUCTION PROJECT

ATLAS International.- A majority of the additional resources needed and a reasonable plan to cover the construction, commissioning and installation of the initial ATLAS detector are in place, but the LHC Committee encourages the Collaboration to continue discussions with funding agencies before implementing further staging in high-level trigger and data acquisition areas. The status of ATLAS was reported to the Resources Review Board in October, 2002 and will be revisited in April, 2003. Some ATLAS highlights follow:

- All of the ATLAS Barrel Torroid and Endcap Torroid conductor is now ready, along with five coil casings and vacuum vessels; the solenoid magnet has been tested.
- Concreting of the main cavern side-walls has reached half-height and support structures are being installed in the counting room.
- Two-thirds of the liquid argon calorimeter barrel pre-sampler detector sectors are produced; this system is constructed by France, Sweden and Morocco and half of this detector (i.e. 32 sectors) has now been inserted into the first calorimeter wheel.

U.S. ATLAS- As of December 31, 2002 the project is 78% complete out of 80% planned, reflecting the most recent update of cost and schedule estimates for the remaining work to complete the baseline scope. On December 13, 2002, a DOE/NSF review of U.S. ATLAS was conducted. There are no major technical issues- all U.S. ATLAS subsystems are now in production and detector components are being successfully delivered to CERN. Cost and Schedule performance is very good. Contingency planning, prioritization and allocation strategies are focused on ensuring that adequate contingency levels can be maintained through project completion. Below are a few highlights of the U.S. ATLAS construction project:

- Silicon: Work continued on the pixel mechanics with significant progress on the pixel-support-tube and the beam pipe adjustment mechanism. Additionally, the various tests to prove readiness for module production were completed and LBNL has begun to make production modules.
- Transition Radiation Tracker: Component Production is now being completed at Hampton. Additionally, mechanical construction of modules is nearing completion at all sites.
- Liquid Argon Electromagnetic (EM) Calorimeter: Prototypes of the negative voltage regulators have arrived and are being tested at Nevis. The Barrel Cryostat cold vessel at CERN has been carefully cleaned in preparation for inserting half of the EM calorimeter. Production of the Forward Calorimeter A module is progressing well and on schedule.
- Tile Hadron Calorimeter: Extended Barrel module construction is complete. Twelve modules have been mounted on the cradle at CERN.
- Muon: During this quarter steady progress was made on the MDT base chamber Series 4 productions at Michigan and Seattle, while the Boston chamber assembly group finished their tooling set-up for their Series 4 run.

5.2 U.S. CMS CONSTRUCTION PROJECT-

CMS International- The funding shortfall is occurring primarily in the Muon, Electromagnetic calorimeter (technical, schedule, and currency exchange difficulties), and Tracker sub-systems, along with Commissioning and Integration (C&I) costs previously assumed to be a CERN responsibility. A number of staging scenarios to alleviate the funding shortfall are presently being studied. The status of CMS was reported to the Resources Review Board in October, 2002 and will be revisited in April, 2003. CMS are now planning how to bring in a working detector on the revised schedule with additional pledged funds which alleviate the shortfall. Some CMS highlights follow:

- The solenoid magnet yoke is now completed; production of conductor and winding of the coil is well advanced and going faster than expected, though coil assembly remains critical path.
- Civil engineering is progressing and building of the main underground cavern wall has started.
- Cavern completion is projected to be July '04, with limited access to services cavern in Feb. '04.

U.S. CMS-. As of December 31, 2002, the overall U.S. CMS Construction Project was 74% complete vs. the scheduled 81% complete. A DOE/NSF review was conducted at Fermilab on December 13, 2002. Technical progress is excellent, and the U.S. CMS construction project is on budget. There are no major schedule slippages, but delays exist in production of some subsystem electronics, particularly the electromagnetic calorimeter electronics, now on the critical path for all of CMS. Below are a few highlights of the U.S. CMS Construction Project.

- Endcap Muon: Cathode Strip Chamber (CSC) panel production is complete and on cost and ahead of schedule. Chamber production at Fermilab is ~80% complete, and also near cost and schedule. CSC testing at the US FAST sites (UCLA and U-Florida, managed by UC-Riverside) is underway, and the first twenty CSC's are being shipped to CERN.
- Hadron Calorimeter (HCAL): both the HB-1 and HB+1 barrels have been delivered to CERN, and have been reassembled at SX-5 and fitted with optical megatiles. Fermilab is now producing production optical decoder units (ODUs) for the HCAL readout boxes; the HCAL HPD's, Hadron Forward (HF) calorimeter fiber, and HF Photo Multiplier Tube's are all beginning to be delivered to CERN. The stuffing of the HF calorimeter with optical fiber has begun.
- Silicon Tracker: Fermilab robotic silicon gantry is fully qualified for production; silicon tracker sensor modules are currently being produced for CERN test beam study. The overall silicon tracker schedule has been vetted, and production parts are scheduled to arrive at Fermilab's SiDet facility during the first quarter of 2003.

5.3 U.S LHC ACCELERATOR CONSTRUCTION PROJECT

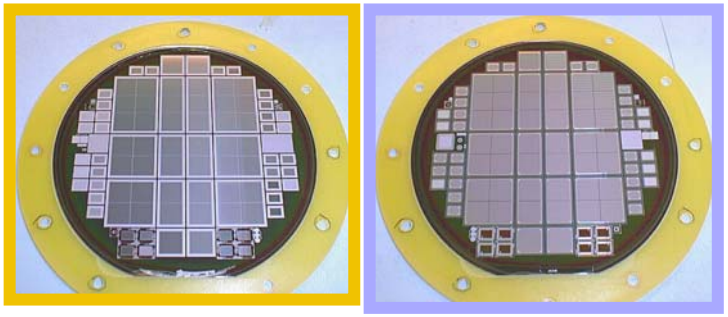
LHC Accelerator- A review of the LHC main magnet and superconductor production status was conducted in November '02. This review found that CERN and its vendors have provided dipole and quadrupole coils and cold masses exceeding CERN performance and quality assurance specifications. Problems related to the insolvency of one of the dipole cold mass fabricators have been resolved. It was also found that superconducting cable production is on the way to peak industrial fabrication, but full production rates have not yet been reached. Reaching of full series production rates by cold mass and cable vendors will be an important indicator for CERN to follow in the months ahead. Some LHC Project highlights follow:

- The first of 360 cold masses containing the main quadrupole of the machine arcs, together with two types of corrector magnets, are ready for shipment to CERN; this is the work of CERN-CES-Saclay and a German firm.
- The European Investment Bank is lending EUR 300 million to finance the final phase of LHC construction; this is part of a European initiative to support cutting-edge, high technology endeavors to support a "knowledge-based, innovation-driven economy".

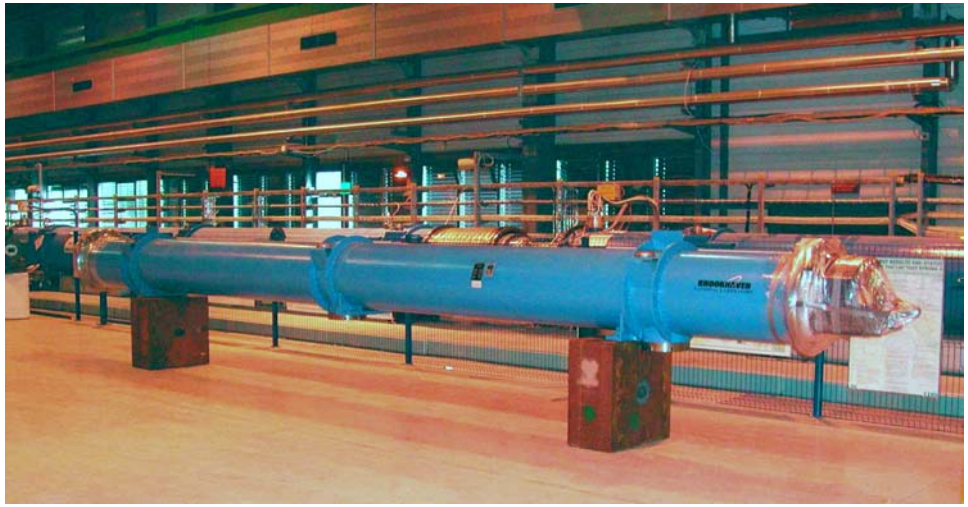
U.S. LHC Accelerator-
As of December 31, 2002, the overall project was 82% percent complete versus the scheduled plan of 86% percent complete. Overall technical progress remains good, and management is finalizing plans to move the last remaining major item, the cryogenic feedboxes, into production. Contingency will be reduced to address engineering change requests and remains a concern that is being closely monitored. The schedule of deliverables is slightly behind plans, but well in advance of CERN requirements. Project highlights are listed below:

- [Fermilab] There is good progress with inner triplet quadrupole magnet production. The first Q2 assembly, consisting of two quadrupoles, was installed on the test stand. Both magnets exceeded the operating field without quenching, and reached a field 12% above this with zero and one quench respectively. The second Q2 cold mass assembly has also started; however, late delivery of correction coils from CERN is expected to delay the start of assembly for the third Q2. Collared coil for the seventh and the coils for the eighth magnet are complete. Four of nine Q1, four of nine Q3 and all nine of the Q2 cryostat vacuum vessels have been received from the vendor.
- [BNL] The first of the D1 magnets has been shipped to CERN, arriving in January. All nine D2 magnets have been cryostated. QQS assemblies have been installed on D1 magnets 1 and 2. Testing has begun on the fourth D2 magnet. All coils for the D4 magnets and eight D3 coils have been completed. Superconducting cable testing proceeded at about 50% of the planned rate this quarter, limited by the rate of delivery of samples from CERN.
- [LBNL] Assembly of the TAN and TAS beam absorbers is well along. The only remaining major subassembly, the electron beam welding of the beam tubes, is under way at two vendors. The complete bid package for the cryogenic feedboxes was released. Quotations are due February 4th.

Below -An ATLAS hadron Tile Calorimter Extended Barral (EB) module at CERN. U.S. ATLAS has completed all 65 EB modules, mechanical assembly and instrumentation (instrumentation work on the fiber optic readouts shown below). 56 of 65 EB modules have been sent to CERN, and all modules meet the 10% uniformity specification.



Above – CMS Forward Pixel (FPIX) sensor wafers have been developed and tested by Purdue University with positive results, showing an improved average pixel breakdown voltage. At left top, is a wafer n-side, and at right top, a wafer p-side from the second submission.



Above- First U.S. produced LHC magnet has arrived at CERN. The Interaction Region D1 dipole was produced by Brookhaven National Laboratory and shipped to CERN in November 2002.

CERN Direct Purchases - DOE reimburses CERN for their payments to qualified U.S. vendors [Reference U.S.-CERN Agreement and Accelerator Protocol].

Table 5.1, Status of DOE Contracts (in $000)

Contract Item	Company (U.S. Supplier)	Contract Price	w/ options & escalation
Niobium-Titanium Alloy Bars	Wah Chang	38,667	48,431
Niobium Sheets	Wah Chang	5,633	6,951
Polyamide Insulation Film	Kaneka High Tech Materials	5,425	6,510
Superconducting Cable	Outokumpu-Advanced Superconductor	16,447	20,985
LHC BPMS Button Feedthroughs	Ceramaseal	898	1,003
Cryogenic Temperature Sensor	Lakeshore		
Cryogenic He Mass Flowmeters	(tbd-contract in process)	1,200	1,200
(tbd-contract in process)	(tbd-contract in process)	(tbd)	3,134
Totals		68,270	88,214

TOTAL Cumulative Payments from DOE to CERN, as of 12/24/2002: 47,214

6. FINANCIAL/COST STATUS AND PLANS (as of December 31, 2002)

TOTAL PROJECT FUNDING PLAN (then year millions of dollars)*

Fiscal Year	FY96	FY97	FY98	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07	Total
Machine Funding Profiles (DOE)													
US LHC Accelerator	2.00	6.67	14.00	15.40	24.92	19.16	10.10	8.70	6.13	2.92	0.00	0.00	110
CERN Direct	0.00	0.00	0.00	8.09	8.29	8.08	11.20	13.40	23.20	17.74	0.00	0.00	90
Machine Total	2.00	6.67	14.00	23.49	33.21	27.24	21.30	22.10	29.33	20.66	0.00	0.00	200
Detector Funding Profiles (DOE and NSF)													
US ATLAS	1.70	3.71	10.05	25.63	28.43	26.77	23.16	24.71	8.99	5.49	3.24	1.88	163.75
DOE	1.70	3.71	10.05	9.00	16.49	14.48	10.51	17.42	8.99	5.49	3.24	1.88	102.95
NSF	0.00	0.00	0.00	16.63	11.94	12.29	12.65	7.29	0.00	0.00	0.00	0.00	60.80
US CMS	2.30	4.61	10.95	38.03	24.26	21.25	21.40	22.91	10.48	5.56	4.20	1.30	167.25
DOE	2.30	4.61	10.95	32.51	20.30	17.15	17.19	20.48	10.48	5.56	4.20	1.30	147.03
NSF	0.00	0.00	0.00	5.52	3.96	4.10	4.21	2.43	0.00	0.00	0.00	0.00	20.22
Detectors Total	4.00	8.32	21.00	63.66	52.69	48.02	44.56	47.62	19.47	11.05	7.44	3.18	

TOTAL DOE & NSF FUNDS, COSTS, & COMMITMENTS (cumulative $000)†

U.S. LHC Construction Project	A = Funds Allocated‡	B = Estimate Actual Costs	C = Open Comittments	D= B+C Total	A–D =Funds Available
U.S. ATLAS	144,158	98,056	1,992	100,048	44,110
U.S. CMS	145,706	100,295	21,060	121,355	24,351
U.S. LHC Accelerator	100,950	88,572	0	88,572	12,378
CERN Direct Purchases	49,060	47,214	0	47,214	1,846
Total	370,150	309,580	17,869	357,189	82,685

* The funding profile for the U.S. LHC Construction Project is extended through FY07, with no change in total funding, to address the impact of the CERN LHC schedule on U.S. project completion. This change was approved by the DOE Director, Office of Science through a U.S. LHC Project baseline change proposal.

† Based on financial reports from the U.S. LHC construction projects. NSF funding is provided after the beginning of the fiscal year and therefore it is necessary to carry-over funding into the subsequent fiscal years.

‡ Pending Congressional authorization of FY03 budget—currently funded under a Continuing Resolution.

7. DOE/NSF COST BASELINES AT LEVEL 2 (in $000)

U.S. ATLAS Cost Baseline

WBS	Description	Previous	Change	Current
1.1	Silicon System	18,993	0	18,993
1.2	Transition Radiation Tracker	9,935	0	9,935
1.3	Liquid Argon Calorimeter	44,348	0	44,348
1.4	Tile Calorimeter	10,283	0	10,283
1.5	Muon Spectrometer	26,386	0	26,386
1.6	Trigger/Data Acquisition System	10,973	0	10,973
1.7	Common Projects	9,179	0	9,179
1.8	Education	286	0	286
1.9	Project Management	8,279	0	8,279
1.10	Technical Coordination	1,300	0	1,300
	Contingency	23,788	0	23,788
	U.S. ATLAS Total Project Cost Baseline	163,750	0	163,750

U.S. CMS Cost Baseline

WBS	Description	Previous	Change	Current
1.1	Endcap Muon	39,259	296	39,555
1.2	Hadron Calorimeter	41,077	1,270	42,347
1.3	Trigger and Data Acquisition	12,408	32	12,440
1.4	Electromagnetic Calorimeter	12,663	- 171	12,492
1.5	Forward Pixels	7,268	113	7,381
1.6	Common Projects	23,000	0	23,000
1.7	Project Office	6,793	7	6,800
1.8	Silicon	3,323	51	3,374
	Contingency	21,459	-1,598	19,861
	U.S. CMS Total Project Cost Baseline	167,250	0	167,250

U.S. LHC Accelerator Cost Baseline

WBS	Description	Previous	Change	Current
1.1	Interaction Region Components	59,850	43	59,893
1.2	Radio Frequency Straight Section	15,983	0	15,983
1.3	Superconducting Wire and Cable	13,225	0	13,225
1.4	Accelerator Physics	3,359	0	3,359
1.5	Project Management	13,270	1	13,271
	Contingency	4,313	-54	4,259
	U.S. LHC Accelerator Total Project Cost Baseline	110,000	0	110,000

8. SCHEDULE STATUS AND PLANS

8.1 U.S. ATLAS Construction Project Milestones

U.S. ATLAS Major Project Milestones (Level 1)

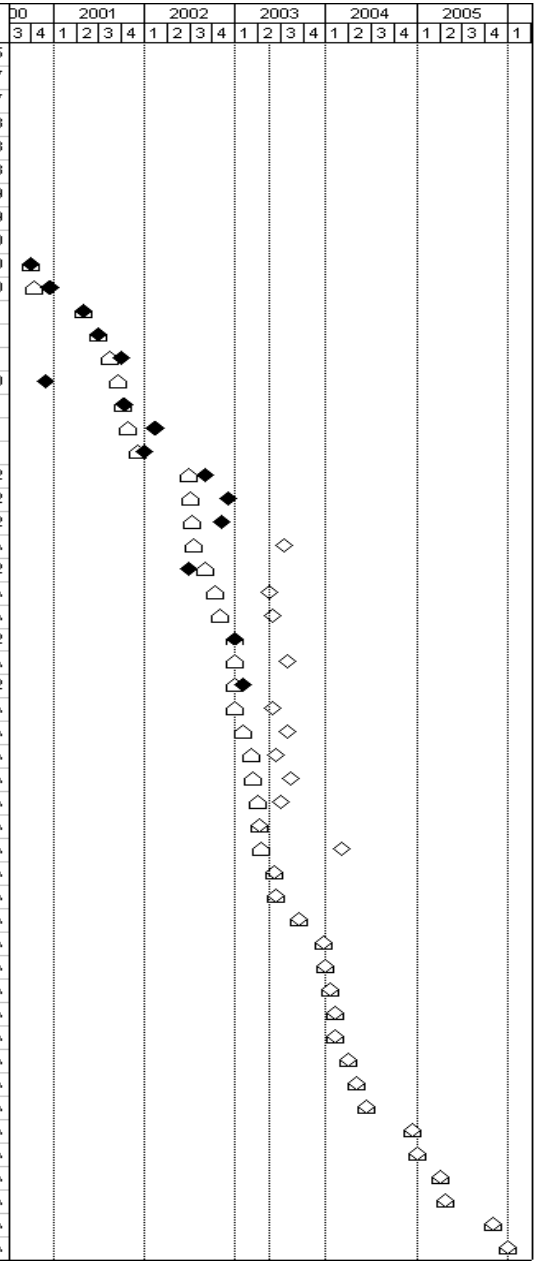
Description	Baseline Schedule	Forecast (F) Date	Actual (A) Date
Project Start	01-Oct-95	01-Oct-95 (F)	01-Oct-95 (A)
CD-4A 97% Project Complete	30-Sep-05	30-Sep-05 (F)	
CD-4B 100% Project Complete	30-Sep-08	30-Sep-08 (F)	

U.S. ATLAS Major Project Milestones (Level 2)

Subsystem	Schedule Designator	Description	Baseline Schedule	Forecast (F) / Actual (A)	Subsystem	Schedule Designator	Description	Baseline Schedule	Forecast (F) / Actual (A)
Silicon (1.1)	SIL L2/1	Start Full Silicon Strip Electronics Production	06-Jul-01	15-Jul-01 (A)	**Tile Cal (1.4)**	Tile L2/1	Start Submodule Procurement	01-Sep-97	01-Sep-97 (A)
	SIL L2/2	Start Full Strip Module Production	12-Apr-02	05-Aug-02(A)		Tile L2/2	Technology Choice for F/E Electronics	15-Nov-97	15-Nov-97 (A)
	SIL L2/3	ROD Design Complete	17-Apr-02	15-Apr-03 (F)		Tile L2/3	Start Module Construction	01-May-99	20-Sep-99 (A)
	SIL L2/4	Complete Shipment of Silicon Strip Module Production	17-Oct-03	17-Oct-03 (F)		Tile L2/4	Start Production of Motherboards	01-Apr-01	30-Mar-01 (A)
	SIL L2/5	ROD Production/Testing Complete	13-Mar-03	13-Mar-03 (F)		Tile L2/5	All Electronic Components Delivered to CERN	01-Oct-02	01-Mar-03 (F)
	SIL L2/6	Pixels 1st IBM Prototype Submitted	26-Jul-01	12-Nov-01(A)		Tile L2/6	Module Construction Complete	30-Sept-02	30-Oct-02 (A)
	SIL L2/7	Pixels Start IBM Production	12-Jun-03	12-Jun-03 (F)		Tile L2/7	All Modules Delivered to CERN	02-Dec-02	**14-Mar-03 (F)**
	SIL L2/8	Pixels Start IBM Outer Bare Module Prod	29-Jan-04	29-Jan-04 (F)	**Muon (1.5)**	Muon L2/1	Start MDT Chambers Lines 1 and 3	17-Jul-00	15-Sep-00 (A)
	SIL L2/9	Pixels Disk System at CERN	20-Jan-05	20-Jan-05 (F)		Muon L2/2	Start CSC Chamber Production	01-Sep-01	01-Oct-01 (A)
TRT (1.2)						Muon L2/3	MDT Electronics ASD PRR	01-Apr-02	30-Aug-02 (A)
Mechanical	TRT L2/1	Final Design Complete	31-Dec-98	07-Dec-98 (A)		Muon L2/4	Global Alignment Device Final Design Complete	01-Aug-02	01-Mar-03 (F)
	TRT L2/2	Module Production Complete (CUM 102)	31-Dec-03	31-Dec-03 (F)		Muon L2/5	CSC IC Production Complete	31-Oct-02	**30-Apr-03 (F)**
	TRT L2/3	Barrel Construction Complete	10-Mar-04	10-Mar-04 (F)		Muon L2/6	Kinematic Mount Design Complete	30-Jan-01	30-Jan-01 (A)
Electrical	TRT L2/4	Select Final Elec Design	15-Jun-01	30-Aug-00 (A)		Muon L2/7	MDT Chambers (U.S.) Production Complete	14-Sep-04	14-Sep-04 (F)
	TRT L2/5	Start Production of ASICS	09-Jul-02	01-Feb-03(F)		Muon L2/8	Kinematic Mount Production Complete	22-Sep-03	22-Sep-03 (F)
	TRT L2/6	Installation Complete	04-Jan-05	04-Jan-05 (F)		Muon L2/9	CSC ROD Production Complete	05-Nov-03	05-Nov-03 (F)
LAr Cal	LAr L2/1	Cryostat Contract Award	24-Jul-98	05-Aug-98(A)		Muon L2/10	MDT Elec.'s Mezzanine Production Complete	26-Sep-03	26-Sep-03 (F)
(1.3)	LAr L2/2	Barrel Feedthroughs Final Design Review	30-Sep-98	02-Oct-98 (A)		Muon L2/12	Global Alignment System Final Delivery	30-Sep-04	30-Sep-04 (F)
	LAr L2/3	Start Electronics Production (Preamps)	30-Jun-00	30-Jun-00 (A)	**Trig/ DAQ**	TDAQ L2/1	Select Final LVL2 Architecture	31-Dec-99	31-Mar-00 (A)
	LAr L2/4	FCAL Mechanical Design Complete	14-Dec-98	15-Dec-99(A)		TDAQ L2/2	LVL2 Trigger Design Complete	31-Dec-02	31-Mar-03(F)
	LAr L2/6	Level 1 Trigger Final Design Complete	30-Mar-02	30-May-02 (A)		TDAQ L2/3	LVL2 Trigger Prototype Complete	30-Sep-02	**30-Apr-03 (F)**
	LAr L2/7	ROD Final Design Complete	12-Dec-02	12-May-03(F)		TDAQ L2/4	Start Production	08-Jan-03	08-Jan-03 (F)
	LAr L2/8	Motherboard System Production Complete	30-Sep-02	30-Sep-02(A)		TDAQ L2/5	Start Installation & Commissioning	05-Mar-03	05-Mar-03 (F)
	LAr L2/9	Cryostat Arrives at CERN	15-May-01	02-Jul-01 (A)		TDAQ L2/6	Production Complete	30-Jul-05	30-Jul-05 (F)
	LAr L2/10	Barrel Feedthroughs Production Complete	01-Jun-02	25-Mar-02(A)		TDAQ L2/7	LVL2 Installation & Commissioning Complete	30-Sep-05	30-Sep-05 (F)
	LAr L2/11	FCAL-C Delivered to EC	15-Jan-03	01-Dec-03 (F)					
	LAr L2/12	FCAL-A Delivered to EC	04-Nov-03	04-Nov-03(F)					

Project Manager's Quarterly Progress Report – 1st Quarter FY 2003
U.S. Large Hadron Collider Construction Project

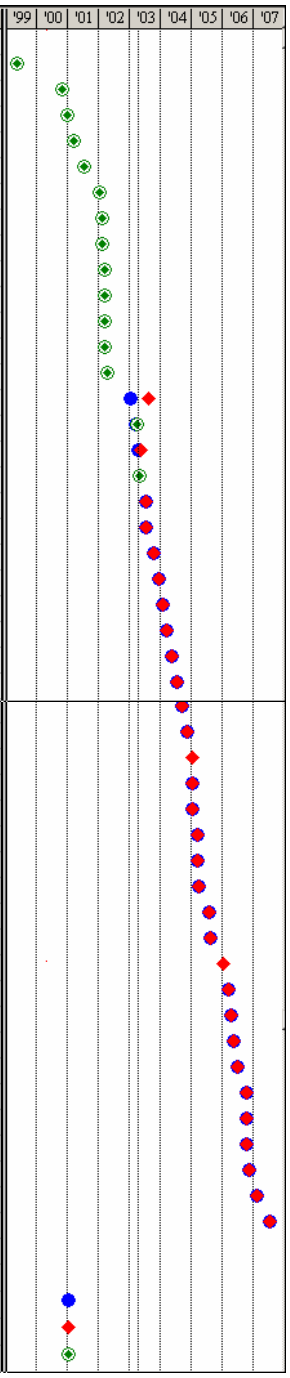
ID	Subsystem ID	Milestone	ETC 02 Baseline	Forecast	Actual
1		Project Start (10/1/95)	Sun 10/1/95	Sun 10/1/95	Sun 10/1/95
2	Tile L2/1	Start Submodule Procurement	Mon 9/1/97	Mon 9/1/97	Mon 9/1/97
3	Tile L2/2	Technology Choice for F/E Electronics	Sat 11/15/97	Sat 11/15/97	Sat 11/15/97
4	LAr L2/1	Cryostat Contract Award	Fri 7/24/98	Wed 8/5/98	Wed 8/5/98
5	LAr L2/2	Barrel FTs Final Design Review	Wed 9/30/98	Fri 10/2/98	Fri 10/2/98
6	TRT L2/1	Final Design Complete	Thu 12/31/98	Mon 12/7/98	Mon 12/7/98
7	LAr L2/4	FCAL Mech Design Complete	Mon 12/14/98	Wed 12/15/99	Wed 12/15/99
8	Tile L2/3	Start Module Construction	Sat 5/1/99	Mon 9/20/99	Mon 9/20/99
9	TDAQ L2/1	Select Final LVL2 Architecture	Fri 12/31/99	Fri 3/31/00	Fri 3/31/00
10	LAr L2/3	Start Elec.'s Production (Preamps)	Fri 6/30/00	Fri 6/30/00	Fri 6/30/00
11	Muon L2/1	Start MDT Chambers Lines 1 & 3	Mon 7/17/00	Fri 9/15/00	Fri 9/15/00
12	Muon L2/6	Kinematic Mount Design Complete	Tue 1/30/01	Tue 1/30/01	Tue 1/30/01
13	Tile L2/4	Start Production of MBs	Sun 4/1/01	Fri 3/30/01	Fri 3/30/01
14	LAr L2/9	Cryostat Arrives at CERN	Tue 5/15/01	Mon 7/2/01	Mon 7/2/01
15	TRT L2/4	Select Final Elec Design	Fri 6/15/01	Wed 8/30/00	Wed 8/30/00
16	Sil L2/1	Start Full Silicon Strip Elec Production	Fri 7/6/01	Sun 7/15/01	Sun 7/15/01
17	Sil L2/6	Pixels '1st IBM Prototype Submitted'	Thu 7/26/01	Mon 11/12/01	Mon 11/12/01
18	Muon L2/2	Start CSC Chamber Production	Sat 9/1/01	Mon 10/1/01	Mon 10/1/01
19	LAr L2/6	Level 1 Trigger Final Design Complete	Sat 3/30/02	Thu 5/30/02	Fri 5/31/02
20	Muon L2/3	MDT Electronics ASD PRR	Mon 4/1/02	Sun 9/1/02	Fri 8/30/02
21	Sil L2/2	Start Full Strip Module Production	Fri 4/12/02	Mon 8/5/02	Mon 8/5/02
22	Sil L2/3	ROD Design Complete	Wed 4/17/02	Tue 4/15/03	NA
23	LAr L2/10	Barrel FTs Production Complete	Sat 6/1/02	Mon 3/25/02	Mon 3/25/02
24	TRT L2/5	Start Production of ASICS	Tue 7/9/02	Mon 2/17/03	NA
25	Muon L2/4	Final Design of Global Align Devices	Thu 8/1/02	Sat 3/1/03	NA
26	LAr L2/8	MB System Production Complete	Mon 9/30/02	Mon 9/30/02	Mon 9/30/02
27	TDAQ L2/3	LVL2 Trigger Prototype Complete	Mon 9/30/02	**Wed 4/30/03**	NA
28	Tile L2/6	Module Construction Complete	Mon 9/30/02	Wed 10/30/02	Wed 10/30/02
29	Tile L2/5	All Elec.'s Components Delivered to ATLAS	Tue 10/1/02	Sat 3/1/03	NA
30	Muon L2/5	CSC IC Production Complete	Thu 10/31/02	Wed 4/30/03	NA
31	Tile L2/7	All Modules Delivered to CERN	Mon 12/2/02	**Fri 3/14/03**	NA
32	LAr L2/7	ROD Final Design Complete	Thu 12/12/02	Mon 5/12/03	NA
33	TDAQ L2/2	LVL2 Trigger Design Complete	Tue 12/31/02	**Mon 3/31/03**	NA
34	TDAQ L2/4	Start Production	Wed 1/8/03	Wed 1/8/03	NA
35	LAr L2/11	FCAL-C Delivered to EC	Wed 1/15/03	Mon 12/1/03	NA
36	TDAQ L2/5	Start Installation & Commissioning	Wed 3/5/03	Wed 3/5/03	NA
37	Sil L2/5	ROD Production/Testing Complete	Thu 3/13/03	Thu 3/13/03	NA
38	Sil L2/7	Pixels 'Start IBM Production'	Thu 6/12/03	Thu 6/12/03	NA
39	Muon L2/8	Kinematic Mount Production Complete	Mon 9/22/03	Mon 9/22/03	NA
40	Muon L2/10	MDT Elec.'s Mezz Production Complete	Fri 9/26/03	Fri 9/26/03	NA
41	Sil L2/4	Compl Shipment of Silicon Strip Modules Prod	Fri 10/17/03	Fri 10/17/03	NA
42	LAr L2/12	FCAL-A Delivered to EC	Tue 11/4/03	Tue 11/4/03	NA
43	Muon L2/9	CSC ROD Production Complete	Wed 11/5/03	Wed 11/5/03	NA
44	TRT L2/2	Module Production Complete (CUM 102)	Wed 12/31/03	Wed 12/31/03	NA
45	Sil L2/8	Pixels 'Start IBM Outer Bare Module Prod'	Thu 1/29/04	Thu 1/29/04	NA
46	TRT L2/3	Barrel Construction Complete	Wed 3/10/04	Wed 3/10/04	NA
47	Muon L2/7	MDT Chambers (U.S.) Prod Compl (Qty. 240)	Tue 9/14/04	Tue 9/14/04	NA
48	Muon L2/12	Global Align System Final Delivery	Thu 9/30/04	Thu 9/30/04	NA
49	TRT L2/6	Installation Complete	Tue 1/4/05	Tue 1/4/05	NA
50	Sil L2/9	Pixels 'Disk System at CERN'	Thu 1/20/05	Thu 1/20/05	NA
51	TDAQ L2/6	Production Complete	Sat 7/30/05	Sat 7/30/05	NA
52	TDAQ L2/7	Installation & Commissioning Complete	Fri 9/30/05	Fri 9/30/05	NA



8.2 U.S. CMS Construction Project Milestones

DOE/NSF Project Manager and U.S. CMS Project Management Group (PMG) Chair milestones (below) are under Change Control as described in the US CMS Project Management Plan. Any 3 month change from the previously approved date in these milestone requires the approval of the DOE/NSF Project Manager and PMG Chair.

	System	Level?	CMS ID	Milestone	v33	Start	Variance
1				**DOE/NSF Proj. Man. / FNAL Dep. Dir. Milestones**	**NA**	**Jan 31 '99**	**0 days**
2	HCAL	ML3*	HB-024	HB: Start Optics Production	Jan 31 '99	Jan 31 '99	0 days
3	MUON	ML2*	ME-011	Begin Assembly of Cathode Strip Chambers at FNAL	Jul 14 '00	Jul 14 '00	0 days
4	HCAL	ML3*	HB-026	HB-1 Optical Assemblies 100% Complete	Sep 15 '00	Sep 15 '00	0 days
5	HCAL	ML2*	HB-010	HB-1 Absorber Delivered to CERN	Nov 30 '00	Nov 30 '00	0 days
6	MUON	ML2*	ME-013	Begin Mass Production of Electronics Boards	Mar 31 '01	Mar 31 '01	0 days
7	HCAL	ML2*	HB-014	HB+1 Absorber Delivered to CERN	Sep 30 '01	Sep 30 '01	0 days
8	HCAL	ML1*	HB-016	HB-1 End Module Assembly in SX5	Oct 30 '01	Oct 30 '01	0 days
9	SiTrkr	ML2*	TS-027	Begin Sensor Module Construction (for M200)	Oct 31 '01	Oct 31 '01	0 days
10	HCAL	ML3*	HG-039	HF: Start PMT Procurement	Nov 30 '01	Nov 30 '01	0 days
11	HCAL	ML3*	HG-1004	Start HPD Procurement	Nov 30 '01	Nov 30 '01	0 days
12	MUON	ML2*	ME-014	Begin Mounting Electronics and Testing at UCLA/UF	Dec 6 '01	Dec 6 '01	0 days
13	CP	ML3*	SY-059	End Assembly of YE+3	Dec 10 '01	Dec 10 '01	0 days
14	HCAL	ML3*	HB-029	HB+1 Optical Assemblies 100% Complete	Dec 31 '01	Dec 31 '01	0 days
15	HCAL	ML2*	HG-1009	HF: PMT Tests 100% Complete	Oct 1 '02	Apr 30 '03	140 days
16	DAQ	ML1*	QR-014	Submit DAQ Technical Design Report (TDR)	Nov 30 '02	Dec 15 '02	10 days
17	HCAL	ML3*	HG-1012	QIE ASIC Production Run Complete	Dec 31 '02	Jan 30 '03	18 days
18	HCAL	ML1*	HB-017	End Assembly of HB+ (Barrel) in SX5	Jan 15 '03	Jan 15 '03	0 days
19	MUON	ML3*	ME-061	70 ME23/2 CSC's Delivered from UC/UF to CERN	Mar 31 '03	Mar 31 '03	0 days
20	HCAL	ML2*	HG-002	HCAL Front-End Electronics Production Complete	Mar 31 '03	Mar 31 '03	0 days
21	ECAL	ML-US*	4.3.8.11m	All Lasers (3) Delivered & Installed at CERN	Jun 30 '03	Jun 30 '03	0 days
22	HCAL	ML2*	HG-1016	HCAL HPD Tests 100% Complete	Aug 29 '03	Aug 29 '03	0 days
23	ECAL	ML3*	EB-027	EB Front-End Electronics Production Launched	Oct 15 '03	Oct 15 '03	0 days
24	SiTrkr	ML2*	TS-1070	25% of Rods Complete	Nov 30 '03	Nov 30 '03	0 days
25	MUON	ML2*	ME-017	All 148 ME23/2 CSC's Delivered from UC/UF to CERN	Jan 31 '04	Jan 31 '04	0 days
26	SiTrkr	ML3*	TS-1073	50% of Rods Completed	Mar 31 '04	Mar 31 '04	0 days
28	FPIX	ML2*	TP-1002	Final Full Size ROC Submission (0.25micron)	May 31 '04	May 31 '04	0 days
29	DAQ	ML2*	QR-1014	Start of Readout and EVB Commissioning	Jul 31 '04	Jul 31 '04	0 days
30	CP	US*	US-CP.01	US CMS Common Project Commitment Complete	NA	Sep 30 '04	0 days
31	ECAL	ML-US*	4.6.1.8m	FPPA Delivery Complete	Oct 1 '04	Oct 1 '04	0 days
32	ECAL	ML-US*	4.6.3.9m	Optical Link Delivery Complete	Oct 1 '04	Oct 1 '04	0 days
33	HCAL	ML3*	HG-1018	HCAL "Slice" Test II in SX5 Complete	Nov 30 '04	Nov 30 '04	0 days
34	TRIG	ML3*	QT-1350	CSC: Muon Port Card Production Test Complete	Nov 30 '04	Nov 30 '04	0 days
35	ECAL	ML3*	EB-046	ECAL Front-End Electronics Production Complete	Dec 15 '04	Dec 15 '04	0 days
36	SiTrkr	ML2*	TS-XXX	TOB Complete	Apr 15 '05	Apr 15 '05	0 days
37	CP	ML1*	IA-1010	UX Ready (Start Lowering Magnet Parts)	Apr 30 '05	Apr 30 '05	0 days
38	PO	US*	US-PO.01	US CMS Project Office Construction Support Complete	NA	Sep 30 '05	0 days
39	TRIG	ML2*	QT-1008	Finish Trigger Installation	Nov 30 '05	Nov 30 '05	0 days
40	HCAL	ML1*	HB-023	End Cabling and Test of HB in UX5	Dec 30 '05	Dec 30 '05	0 days
41	DAQ	ML2*	QR-1023	DAQ.0: 25% Performance Installed	Jan 31 '06	Jan 31 '06	0 days
42	FPIX	ML2*	TP-1015	First Butterfly Ready	Mar 15 '06	Mar 15 '06	0 days
43	HCAL	ML1*	HE-015	End Cabling and Test of HE-1 in UX5	Jun 30 '06	Jun 30 '06	0 days
44	ECAL	ML1*	EG-019	End Inst., Test, & Debug. of EB (barrel) in UX5	Jun 30 '06	Jun 30 '06	0 days
45	SiTrkr	ML1*	TG-014	End Installation and Cabling of SiTrkr in UX5	Jun 30 '06	Jun 30 '06	0 days
46	MUON	ML1*	ME-1083	End UX inst/cabling/test of CSC stations on YE-	Jul 31 '06	Jul 31 '06	0 days
47	HCAL	ML1*	HF-025	HF: Installation and Testing in UX5 Complete	Nov 9 '06	Nov 9 '06	0 days
48	FPIX	ML2*	TP-1004	Pixel Tracker at SX5, Ready for Installation	Mar 30 '07	Mar 30 '07	0 days
49					NA	Sep 30 '05	0 days
50		Notes		*MLx * Denotes Joint CMS & Agency PM/FNAL Dep Dir*	NA	Sep 30 '05	0 days
51				*Baseline Milestone Symbol (CMS v33 Schedule)*	NA	Oct 1 '00	0 days
52				*Projected Milestone Symbol*	NA	Oct 1 '00	0 days
53				*Achieved Milestone Symbol*	NA	Oct 1 '00	0 days



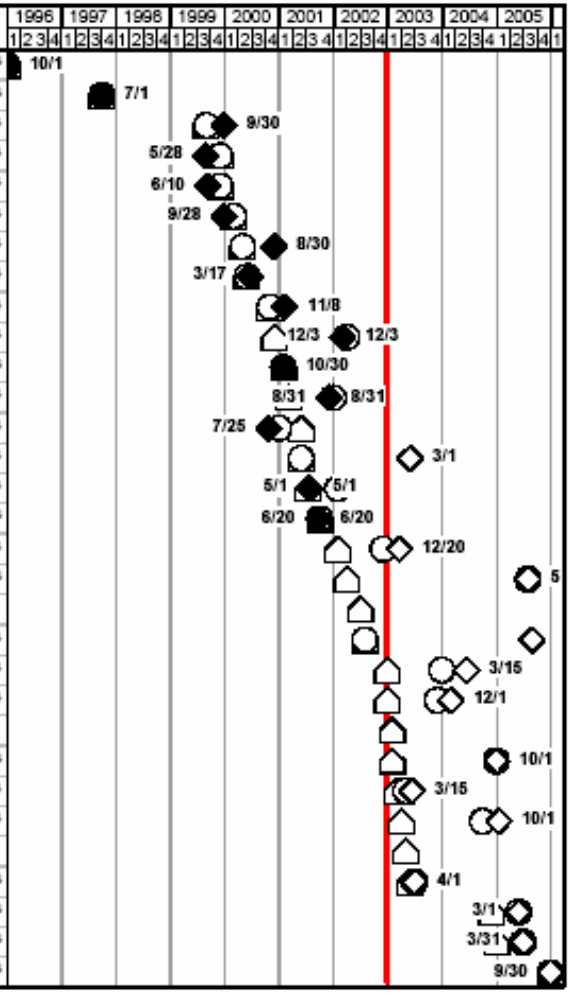
8.3 U.S. LHC Accelerator Construction Project Milestones

Table 8.3 Level 1&2 U.S. LHC Accelerator Baseline Milestones through 2003

WBS Identifiers	Milestone Description	Baseline Date	Forecast(F) or Actual(A)
Project	Decision as to whether or not the US Project includes RF region quadrupoles	1 Jul 01	20 Jun 01 (A)
Project	Project completion	30 Sep 05	30 Sep 05 (F)
Int Region	Begin 1st inner triplet quadrupole model magnet	1 Jul 97	1 Jul 97 (A)
Int Region	Complete quadrupole model magnet program phase 1	1 Dec 99	28 Sep 99 (A)
Int Region	Complete quadrupole model magnet program phase 2	1 Mar 00	17 Mar 00 (A)
Int Region	Place purchase order for HTS power leads	1 Feb 00	30 Aug 00 (A)
Int Region	Begin absorber fabrication	1 Nov 00	30 Oct 00 (A)
Int Region	Complete inner triplet quadrupole prototype program	1 Oct 01	31 Aug 01 (A)
Int Region	Begin IR beam separation dipole production assembly	1 Oct 00	25 Jul 00 (A)
Int Region	Begin inner triplet feedbox fabrication	1 Mar 01	1 Apr 03 (F)
Int Region	Begin inner triplet quadrupole production assembly	1 Nov 01	1 May 01 (A)
Int Region	Complete 1st inner triplet quadrupole magnet	1 Sep 02	13 Mar 03 (F)
Int Region	Complete inner triplet feedbox fabrication	1 May 02	31 Aug 05(F)
Int Region	Delivery of all inner triplet system components for IR8 left (MQX, DFBXG, D1, D2)	1 Oct 03	1 Jul 04 (F)
Int Region	Complete absorber fabrication	1 Feb 03	15 Jul 03 (F)
Int Region	Complete IR dipole production assembly	1 Apr 03	1 Apr 03 (F)
Int Region	Delivery of all inner triplet system components for IR8 right (MQX, DFBXH, D1, D2)	1 Jul 04	1 Jan 05 (F)
Int Region	Complete interaction region beam separation dipole production assembly	1 Apr 03	1 Apr 03 (F)
Int Region	Delivery of all inner triplet sys. components for IR1 left (MQX,DFBXA,D2,TAS,TAN)	1 Jul 04	1 Nov 04 (F)
Int Region	Delivery of all inner triplet sys. components for IR5 left (MQX,DFBXE,D2,TAS,TAN)	1 May 05	1 Sep 05 (F)
Int Region	Delivery of all inner triplet sys. components for IR5 right(MQX,DFBXF,D2,TAS,TAN)	1 Jun 05	1 Jul 05 (F)
Int Region	Delivery of all inner triplet system components for IR2 right (MQX, DFBXD, D1, D2)	1 Sep 04	1 Sep 04 (F)
Int Region	Delivery of all inner triplet sys. components for IR1 right(MQX,DFBXB,D2,TAS,TAN)	1 Mar 04	1 Mar 05 (F)
Int Region	Complete inner triplet quadrupole production	1 Mar 05	1 Mar 05 (F)
Int Region	Delivery of all inner triplet system components for IR2 left (MQX, DFBXC, D1, D2)	1 Mar 04	1 May 05 (F)
Int Region	Interaction Region task complete	30 Sep 05	30 Sep 05 (F)
RF Region	Begin assembly of 1st dipole model magnet	1 Sep 99	10 Jun 99 (A)
RF Region	Complete dipole model magnet program	1 Aug 00	8 Nov 00 (A)
RF Region	Begin RF region dipole production assembly	1 Jan 02	3 Dec 01 (A)
RF Region	Delivery of D3, D4 for IR4 right	1 May 05	1 May 05 (F)
RF Region	Complete RF region dipole production assembly	1 Sep 03	1 Dec 03 (F)
RF Region	Delivery of D3, D4 for IR4 left	1 Oct 04	1 Oct 04 (F)
RF Region	RF Region task complete	30 Sep 05	30 Sep 05 (F)
SC Cable	All cable prod. support equipment delivered to CERN	1 Sep 99	28 May 99 (A)
SC Cable	Complete SC testing facility upgrades	1 Jun 99	30 Sep 99 (A)
SC Cable	Series wire and cable testing complete	31 Mar 05	31 Mar 05(F)

WBS Identifiers	Milestone Description	Baseline Date	Forecast(F) or Actual(A)
SC Cable	Superconducting Wire and Cable task complete	30 Sep 05	30 Sep 05 (F)

Number	ID	Milestone	Original	Revised	Forecast	Actual	Variance
1-1		Project Start (10/1/95)	10/1/95	10/1/95	10/1/95	10/1/95	0 days
2-1.1-1	IR	Begin 1st Inner Triplet Quadrupole Model Magnet	7/1/97	7/1/97	7/1/97	7/1/97	0 days
2-1.3-1	SC	Complete Superconductor Test Facility Upgrades	6/1/99	6/1/99	9/30/99	9/30/99	87 days
2-1.3-2	SC	All Cable Production Support Equipment Delivered to CERN	9/1/99	9/1/99	5/28/99	5/28/99	-68 days
2-1.2-1	RF	Begin Assembly of 1st Dipole Model Magnet	9/1/99	9/1/99	6/10/99	6/10/99	-59 days
2-1.1-2	IR	Complete Inner Triplet Quadrupole Model Magnet Program Phase 1	12/1/99	12/1/99	9/28/99	9/28/99	-46 days
2-1.1-4	IR	Place Purchase Order for HTS Power Leads	2/1/00	2/1/00	8/30/00	8/30/00	151 days
2-1.1-3	IR	Complete Inner Triplet Quadrupole Model Magnet Program Phase 2	3/1/00	3/1/00	3/17/00	3/17/00	12 days
2-1.2-2	RF	Complete Dipole Model Magnet Program	8/1/00	8/1/00	11/8/00	11/8/00	71 days
2-1.2-3	RF	Begin RF Region Dipole Production Assembly	9/1/00	1/1/02	12/3/01	12/3/01	-21 days
2-1.1-5	IR	Begin Absorber Fabrication	11/1/00	11/1/00	10/30/00	10/30/00	-2 days
2-1.1-6	IR	Complete Inner Triplet Quadrupole Prototype Magnet Program	12/1/00	10/1/01	8/31/01	8/31/01	-21 days
2-1.1-7	IR	Begin Interaction Region Beam Seperation Dipole Prod. Assembly	3/1/01	10/1/00	7/25/00	7/25/00	-49 days
2-1.1-8	IR	Begin Inner Triplet Feedbox Fabrication	3/1/01	3/1/01	3/1/03	NA	522 days
2-1.1-9	IR	Begin Inner Triplet Quadrupole Production Assembly	4/15/01	11/1/01	5/1/01	5/1/01	-132 days
1-2		Decision on RF Region Quadrupoles	7/1/01	7/1/01	6/20/01	6/20/01	-8 days
2-1.1-10	IR	Complete 1st Inner Triplet Quadrupole Magnet	11/1/01	9/1/02	12/20/02	NA	79 days
2-1.2-4	RF	Delivery of D3, D4 for IR4 right	1/1/02	5/1/05	5/1/05	NA	0 days
2-1.1-11	IR	Delivery of D2 for IR8 Left **DELETED**	4/1/02				
2-1.1-12	IR	Complete Inner Triplet Feedbox Fabrication	5/1/02	5/1/02	5/30/05	NA	803 days
2-1.1-13	IR	Delivery of All Inner Triplet System Components for IR8 Left (MQX,DFBX,D1,D2)	10/1/02	10/1/03	3/15/04	NA	118 days
2-1.2-5	RF	Complete RF Region Dipole Production Assembly	10/1/02	9/1/03	12/1/03	NA	65 days
2-1.1-14	IR	Delivery of D2 for IR5 Left **DELETED**	11/1/02				
2-1.2-6	RF	Delivery of D3, D4 for IR4 left	11/1/02	10/1/04	10/1/04	NA	0 days
2-1.1-15	IR	Complete Absorber Fabrication	12/1/02	2/1/03	3/15/03	NA	30 days
2-1.1-16	IR	Delivery of All Inner Triplet System Components for IR8 Right (MQX,DFBX,D1,D2)	1/1/03	7/1/04	10/18/04	NA	77 days
2-1.1-17	IR	Delivery of D2 for IR8 Right**DELETED**	2/1/03				
2-1.1-18	IR	Complete Interaction Region Dipole Production Assembly	3/1/03	4/1/03	4/1/03	NA	0 days
2-1.1-30	IR	Complete Inner Triplet Quadrupole Production	9/1/04	3/1/05	3/1/05	NA	0 days
2-1.3-3	SC	Series Wire and Cable Testing Complete	10/1/04	3/31/05	3/31/05	NA	0 days
1-3		Project Completion (9/30/05)	9/30/05	9/30/05	9/30/05	NA	0 days



Date: 2/13/03

Original Baseline
Revised Baseline
Forecast
Actual
External Milestone
External Milestone
External Milestone
Deadline

9. TECHNICAL BASELINE STATUS

U.S. ATLAS Construction Project - No change. The U.S. ATLAS collaboration defined a list of initial deliverables representing the U.S. contribution to ATLAS. This list was approved by the JOG in March 1998. Deliverables are listed in the U.S. ATLAS Construction Project Management Plan, Appendix 3.

U.S. CMS Construction Project - No change. The U.S. CMS collaboration defined a list of deliverables representing the U.S. contribution to CMS. This list was approved by the JOG in October 1998. The scope of U.S. CMS contribution is described in the U.S. CMS Project Management Plan, Appendix 2.

U.S. LHC Accelerator Construction Project - No change. U.S. LHC Accelerator Project - The U.S. deliverables to CERN are defined in the Implementing Arrangement (IA) to the Accelerator Protocol. The IA was signed by the CERN and U.S. signatories in July 1998 and revised in May 2002 to update delivery dates to match CERN schedule and address a CERN-directed change on RF region lattice design impacting U.S. work (reference the U.S. LHC Accelerator Project Management Plan, Annex II).

CERN Direct Purchases - No change. CERN will procure from U.S. industrial firms supplies required to construct the LHC accelerator. These supplies will include superconducting alloy, cable, insulation, and other materials.

10. BASELINE CHANGE ACTIVITY

Baseline Control Level	Baseline Changes
Level 1, DOE/NSF Joint Oversight Group	One Change this quarter*
Level 2, DOE/NSF Project Office	
U.S. ATLAS	No changes to the Level 2 cost, scope and schedule baseline.
U.S. CMS	Changes to the Level 2 cost, scope and schedule baseline.
U.S. LHC Accelerator	Changes to the Level 2 cost, scope and schedule baseline.

* The DOE Director, Office of Science approved this Level 1 change as the DOE Acquisition Executive. This change established a two-phased CD-4 milestone. CD-4A is 97% complete. CD-4B is completion of the remaining 3% of US commitments, which are dependent upon the startup of the LHC and the CERN schedule. Funding profile is extended through FY07. No change in US LHC Total Project Cost.

APPENDIX A - FUNDING BY INSTITUTION (in thousands of dollars), U.S. CMS

U.S. CMS Construction Project

	FY 1998				FY 1999				FY 2000				FY 2001				FY 2002				
Institution	DOE Grant	DOE Contract	NSF	Total	DOE Grant	DOE Contract	NSF	Total	DOE Grant	DOE Contract	NSF	Total	DOE Grant	DOE Contract	NSF	Total	DOE Grant	DOE Contract	NSF	Total	Grand Total
FNAL	0	5,517	0	5,517	0	10,817	40	10,857	0	5,981	0	5,981	0	6,033	0	6,033		6,318	14	6,332	34,720
Fairfield	0	29	0	29	0	0	0	0	0	10	0	10	0	13	0	13		8		8	60
Maryland	90	65	0	155	0	132	131	263	0	250	0	250	0	189	0	189		1,361		1,361	2,218
Boston U.	0	32	0	32	31	111	0	142	0	132	0	132	0	88	0	88		222	1,130	1,352	1,746
Florida State	60	54	0	114	71	118	0	189	80	54	0	134	68	43	0	111	50	16		66	614
U. of Minnesota	60	95	0	155	161	452	0	613	141	202	0	343	153	401	0	554	85	305		390	2,055
U. of Iowa	77	62	0	139	20	5	0	25	0	453	0	453	0	843	0	843		48		48	1,508
U. of Rochester	127	1,159	0	1,286	262	485	0	747	441	253	0	694	464	143	0	607	358	162		520	3,854
Notre Dame	0	52	0	52	0	44	184	228	0	14	193	207	0	14	112	126		17	209	226	839
Purdue	38	135	0	173	49	166	0	215	0	175	0	175	0	89	0	89		377		377	1,029
U. of Miss.	46	100	0	146	68	91	0	159	69	108	0	236	0	235	0	235	34	109		143	919
U. of Florida	44	95	0	139	184	412	0	596	332	853	0	1,185	432	293	0	725	171	310		481	3,126
Ohio State U.	140	64	0	204	275	212	0	487	196	732	0	928	151	700	0	851	180	916		1,096	3,566
Carnegie Mellon	0	113	0	113	0	291	0	291	0	312	0	312	0	258	0	258		301		301	1,275
Rice	138	19	0	157	102	56	0	158	132	16	0	148	196	36	0	232	134	61		195	890
U. of Wisconsin	533	1,052	0	1,585	471	3,598	0	4,069	722	2,995	0	3,717	504	4,489	0	4,993	193	1,620	63	1,876	16,240
U.C. Davis	34	100	0	134	0	78	0	78	0	502	0	502	0	63	0	63		200		200	977
UCLA	150	87	0	237	249	173	0	422	244	391	0	635	347	546	42	935	284	496	43	823	3,052
U.C. Riverside	20	10	0	30	0	164	0	164	0	70	0	70	0	72	0	72		74		74	410
John Hopkins	0	29	0	29	0	0	70	70	0	0	40	40	0	0	5	5			7	7	151
Northwestern	0	59	0	59	5	26	0	31	0	114	0	114	0	39	0	39		33		33	276
Rutgers	0	13	0	13	0	0	34	34	0	2	140	142	0	0	101	101			127	127	417
Princeton	0	256	0	256	0	626	0	626	0	667	0	667	0	133	0	133		11		11	1,693
Caltech	0	148	0	148	0	458	0	458	0	367	0	367	0	452	0	452		116		116	1,541
U.C. San Diego	11	0	0	11	11	90	24	125	36	0	0	36	0	43	0	43		57		57	272
Northeastern	0	0	0	0	0	0	3,370	3,370	0	0	1,741	1,741	0	0	1,482	1,482			3,073	3,073	9,666
U. Ill.-Chicago	0	0	0	0	0	0	124	124	0	0	309	309	0	0	262	262			172	172	867
U. of Nebraska	0	0	0	0	0	0	24	24	0	0	2	2	0	0	100	100			7	7	133
MIT	0	37	0	37	15	67	0	82	0	78	0	78	0	87	0	87		58		58	342
Iowa State	0	0	0	0	0	0	19	19	0	356	0	356	0	29	0	29		177		177	581
Kansas State													0	66	0	66		28		28	94
LBL													0	554	0	554		543		543	1,097
Texas Tech													0	876	0	876		275		275	1,151
UC Santa Barbara													0	13	0	13		461		461	474
U. of Kansas													0	0	6	6			210	210	216
Florida Inst. Tech.																		60		60	60
Subtotal	1,568	9,382	0	10,950	1,974	18,672	4,020	24,666	2,393	15,087	2,425	19,964	2,315	16,840	2,110	21,265	1,489	14,740	5,055	21,284	98,129

As of 12/3/02

APPENDIX B - FUNDING BY INSTITUTION (in thousands of dollars), U.S. ATLAS

U.S. ATLAS Construction Project

	FY 1998				FY 1999				FY 2000				FY 2001				FY 2002				
Institution	DOE Grant	Contract	NSF	Total	DOE Grant	Contract	NSF	Total	DOE Grant	Contract	NSF	Total	DOE Grant	Contract	NSF	Total	DOE Grant	Contract	NSF	Total	Grand Total
ANL	-	1,098	-	1,098	-	967	-	967	-	922	-	922	-	572	-	572		771		771	4,330
BNL	-	3,903	-	3,903	-	2,581	-	2,581	-	6,429	-	6,429	-	7,213	-	7,213	392	5,104		5,495	25,621
LBNL	-	633	-	633	-	715	-	715	-	420	-	420	-	1,775	-	1,775		2,049		2,049	5,592
SUNY/Albany	20	-	-	20	48	-	-	48	50	-	-	50	-	-	-	-				-	118
U. of Arizona	320	100	-	420	634	-	-	634	557	-	-	557	298	153	-	451		378		378	2,440
Boston U.	224	-	-	224	298	-	-	298	287	-	-	287	155	336	-	491		295	277	572	1,872
Brandeis U.	265	45	-	310	-	-	593	593	-	-	478	478	-	-	731	731			406	406	2,518
U.C.Irvine	193	-	-	193	-	-	93	93	-	-	-	-	-	-	266	266				-	552
U.C. Santa Cruz	404	-	-	404	63	-	-	63	-	-	568	568	-	-	2,702	2,702			442	442	4,179 *
U. of Chicago	-	54	-	54	-	-	1,069	1,069	-	-	264	264	-	-	723	723			159	159	2,269
Duke U.	190	-	-	190	601	-	-	601	417	-	-	417	501	158	-	659			375	375	2,242
Hampton U.	-	-	-	-	-	-	538	538	-	-	293	293	-	-	590	590			204	204	1,625
Harvard	234	-	-	234	-	-	654	654	-	-	390	390	-	-	3,882	3,882			953	953	6,113 *
U. of Illinois	50	159	-	209	347	-	-	347	294	-	-	294	76	-	-	76	99			99	1,025
Indiana U.	190	-	-	190	765	-	-	765	460	-	-	460	-	713	-	713		361		361	2,489
MIT	50	-	-	50	105	-	-	105	334	-	-	334	190	237	-	427	389			389	1,305
Michigan State	-	35	-	35	-	-	178	178	-	-	293	293	-	-	316	316				-	822
Nevis/Columbia	-	675	-	675	-	-	2,680	2,680	-	-	1,422	1,422	-	-	4,483	4,483			3,632	3,532	12,791
U. of New Mex.	20	-	-	20	30	-	-	30	24	-	-	24	-	127	-	127		57		57	258
Northern Illinois	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				-	-
Ohio State U.	-	-	-	-	100	-	-	100	45	-	-	45	-	-	-	-	157			157	302
U. of Michigan	62	254	-	316	716	-	-	716	518	-	-	518	681	-	-	681	230		487	717	2,948
U. of Oklahoma	30	-	-	30	-	-	41	41	-	-	51	51	-	-	49	49			202	202	373 *
U. of Penn.	250	-	-	250	300	-	-	300	265	-	-	265	679	-	-	679			850	850	2,344
U. of Pittsburg	110	-	-	110	-	-	150	150	-	-	210	210	-	50	201	251			630	630	1,351
U. of Rochester	-	-	-	-	-	-	3,587	3,587	-	-	1,664	1,664	-	-	1,477	1,477				-	6,728
U.T. Arlington	50	82	-	132	-	-	474	474	-	-	230	230	-	-	584	584				-	1,420
S. Methodist	40	-	-	40	124	-	-	124	30	-	-	30	87	184	-	271	98			98	563
SUNY/Stony B.	27	-	-	27	-	-	1,045	1,045	-	-	1,037	1,037	-	-	426	426			89	89	2,624
Tufts University	50	-	-	50	20	-	-	20	20	-	-	20	-	-	-	-	11			11	101
U. Washington	-	-	-	-	-	-	240	240	-	-	318	318	-	-	1,377	1,377			737	737	2,672
U. of Wisconsin	230	-	-	230	429	-	-	429	665	-	-	665	1,112	-	-	1,112	377			377	2,813
Subtotal	3,009	7,038	-	10,047	4,580	4,263	11,342	20,185	3,966	7,771	7,218	18,955	3,779	11,518	17,807	33,104	1,752	9,014	9,343	20,108	102,399
Reserve	-	3	-	3	157	-	5,289	5,446	327	1,936	1,795	4,058	-	300	-			118		118	9,625
									-	2,602	2,928	5,530	-	-	-					-	5,530 *
Total	3,009	7,041	-	10,050	4,737	4,263	16,631	25,631	4,293	12,309	11,941	28,543	3,779	11,818	17,807	33,104	1,752	9,132	9,343	20,226	117,554